

Robinson, Jesse (EEC)

From: Zimmerman, Joseph (FW)
Sent: Tuesday, September 15, 2009 12:02 PM
To: Robinson, Jesse (EEC); 'Jarrett, Patti G LRL'
Cc: Lewis, Rob (FW); Dawson, Doug (FW); Grant, Alan (EEC); Hardin, Mike (FW)
Subject: FW: Shear Stress Questions on Locust Creek
Follow Up Flag: Follow up
Flag Status: Red
Attachments: Shear_Stress_Analysis9.14.09.pdf

Jesse,

See Stantec's response below. Thanks.

Joseph Zimmerman

Kentucky Wetland and Stream Mitigation Program
 Kentucky Department of Fish and Wildlife Resources
 #1 Sportsman's Lane
 Frankfort, KY 40601
 (502) 564-7109 ext. 4453
 (800) 858-1549 ext. 4453
 (502) 545-1956 cell

Did you know...The world record smallmouth bass (11 lb. 15 oz) was caught in Kentucky?

Experience the Unbridled Spirit of Kentucky

www.kentuckyunbridledspirit.com

Confidentiality Notice: *This e-mail message, including any attachment, is for the sole use of the intended recipient (s) and may contain confidential information. Any unauthorized review, use, disclosure or distribution is strictly prohibited. If you are not the intended recipient, please contact the sender, by e-mail, and destroy all copies of the original message.*

From: Lawson, Wanda [mailto:Wanda.Lawson@stantec.com]
Sent: Tuesday, September 15, 2009 8:38 AM
To: Zimmerman, Joseph (FW)
Cc: Eigel, Joe; Athanasakes, George
Subject: RE: Shear Stress Questions on Locust Creek

Joseph,

To further address concerns regarding shear stress values on the floodplains of the Locust Creek project, we have provided additional supporting information.

The original shear stress calculations were actually too conservative, over-estimating the shear stress on the floodplains of the steeper reaches. Please see the attached document for revised shear stress calculations for the project. The shear stress calculations are much lower than the original calculations for 2 reasons: 1.

Originally, the "bankfull flow" was not excluded from the floodplain depth calculations. Essentially removing the volume of flow that would travel through the bankfull channel from the total 100-year flow, reduced the final depth of flow on the floodplain. 2. The Manning's n value of 0.12 for a forested floodplain is actually for lower gradient stream systems with wide, forested floodplains. The much more appropriated Manning's n value for steeper gradient, confined stream systems is 0.04. These are described as "mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages". This also reduced the final depth of flow on the floodplain, which is used to calculate the shear stress and is displayed for each reach on the attachment.

Also, the steeper reaches on the Locust Creek Project, such as reaches 1 through 4, are built as multi-stage channels with several rock and log structures throughout each reach. The weir width of the rock step pools is slightly less than bankfull width, providing a low flow channel for habitat. The actual step-pool widths of the rock and log structures are 1.75 X bankfull width and the sills that extend up onto the floodplains are at least an additional 1/3 X bankfull width on each side. The total width of the rock and log step-pools extend out to about 2.5 X bankfull width, creating the second stage of the channel. This second stage of the channel is estimated to contain the 25 to 50 year flood flows and is protected by structures built with large boulders and logs. The third and final stage of the channel extends the full width of the floodplain and is designed according to the 100-year flood flows. For the 100-year flood, the flows would extend out beyond the rock and log structures, however the depth of the flow on the floodplain beyond the structures would be even less than the depth estimated on the attached document. The average depth on the floodplain is greater than the depths of flow at the far right and left corners of the cross sectional flow. With this in mind, the shear stress values beyond the structures would be less than those contained within the step pool systems. Additionally, we have specified Dekowe 900 and 700 Coir Fiber erosion control blanket to be installed along each of the reaches that will extend from the edge of the structures and step pools out onto the floodplain. On the steeper reaches the erosion control blanket will extend out to a distance greater than the 100-year floodplain width. The Dekowe 900 and 700 Coir Fiber erosion control blanket specifications show that the blanket can withstand up to 4.63 and 4.46 lbs/sq.ft. of shear stress, which is much greater than the shear stress on the floodplains.

Finally, once the coir fiber erosion control blanket degrades after 4-5 years, the floodplain is expected to have a young established stand of hardwood trees in addition to a well established stand of long native grasses. As mentioned above, the shear stress on the floodplains beyond/adjacent to the step pool structures will be less than the calculated values shown and the established vegetation is expected to provide more than adequate stability.

We hope this provides you with the information needed to better evaluate the conditions and design of this project. Please feel free to email or call us if you have any other questions.

Thanks,
Wanda

Wanda Lawson, PE
Project Engineer
Stantec Consulting
1901 Nelson Miller Parkway
Louisville KY 40223-2177
Ph: (502) 212-5016
Fx: (502) 212-5055
Cell: (502) 718-4056
Wanda.Lawson@Stantec.com
stantec.com

The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.



Please consider the environment before printing this email.

From: Robinson, Jesse (EEC)
Sent: Wednesday, September 02, 2009 8:54 AM
To: Zimmerman, Joseph (FW); 'Jarrett, Patti G LRL'
Cc: Dawson, Doug (FW); Grant, Alan (EEC); Hardin, Mike (FW); 'Joe Eigel'

11/3/2009

Subject: RE: Shear Stress Questions on Locust Creek

Any progress on this request?

Thank you,
Jesse Robinson

From: Robinson, Jesse (EEC)
Sent: Friday, July 31, 2009 12:11 PM
To: Zimmerman, Joseph (FW); 'Jarrett, Patti G LRL'
Cc: Dawson, Doug (FW); Grant, Alan (EEC); Hardin, Mike (FW); 'Joe Eigel'
Subject: RE: Shear Stress Questions on Locust Creek

Joseph and Dr. Eigel,

I appreciate your consideration of the shear stress issue. If it is your judgment that step pools are an appropriate choice for channel stability in the area in question, I will defer to your judgment. I'm not an engineer. I would still like to know what will be done to ensure the stability of the floodprone area adjacent to these structures. Assuming the Fischenich paper is correct or close enough, it appears that the shear stress values provided in Appendix J will exceed the tolerance for vegetation. How will this be handled?

I didn't really intend for KY 15 to be a part of this conversation; it was just an anecdote to illustrate my understanding of how a step pool structure could fail if the supporting material surrounding it was removed. I will address some of my concerns with that project separately and directly, once I have had a chance to gather enough information.

Thank you for your consideration,

Jesse Robinson
Environmental Biologist
Kentucky Division of Water
[Water Quality Certification](#)
(502) - 564 - 3410 ext. 4863

From: Zimmerman, Joseph (FW)
Sent: Tuesday, July 28, 2009 9:27 AM
To: 'Jarrett, Patti G LRL'; Robinson, Jesse (EEC)
Cc: Dawson, Doug (FW); Grant, Alan (EEC); Hardin, Mike (FW)
Subject: FW: Shear Stress Questions on Locust Creek

Patti and Jesse,

Below is Stantec's response regarding stresses at Locust Creek. If we need to set up a meeting or look into this further let me know. Thanks.

Joseph Zimmerman
Kentucky Wetland and Stream Mitigation Program
Kentucky Department of Fish and Wildlife Resources
#1 Sportsman's Lane
Frankfort, KY 40601
(502) 564-7109 ext. 4453
(800) 858-1549 ext. 4453
(502) 545-1956 cell

Did you know...The world record smallmouth bass (11 lb. 15 oz) was caught in Kentucky?

Experience the Unbridled Spirit of Kentucky
www.kentuckyunbridledspirit.com

Confidentiality Notice: This e-mail message, including any attachment, is for the sole use of the intended recipient (s) and may contain confidential information. Any unauthorized review, use, disclosure or distribution is strictly prohibited. If you are not the intended recipient, please contact the sender, by e-mail, and destroy all copies of the original message.

From: Eigel, Joe [mailto:Joe.Eigel@stantec.com]
Sent: Monday, July 27, 2009 6:37 PM
To: Zimmerman, Joseph (FW)
Cc: Athanasakes, George; Hall, Stephen; Lawson, Wanda
Subject: Shear Stress Questions on Locust Creek

Joseph,

We understand the concerns about the shear stresses on the steep slopes on the Locust Creek project and have reviewed the Fisichenich paper provided by DOW.

In response, first we believe that our shear stress estimates are very conservative and actually over estimate shear stresses. Secondly, we realize that vegetation, bioengineering treatments, erosion control fabrics and essentially all channel liners have their limitations. This was apparent early in the design process and we determined that more traditional liners would not be adequate on the steeper slopes for the Locust Creek project, nor would they be appropriate given the existing valley type and corresponding stream type needed for the design. As you know for this particular project, it is not practical to lower the slope or significantly widen the floodplain to decrease flood flow depths. This is why we have chosen to use rock step pools and other step structures to dissipate energy in these channels.

While we try to limit their use, we have had great success with step pools and similar structures on streams in steep valleys as long as we limit the drop across the structure to a foot or less (the majority of the structures on Locust Creek will have less than 9-inch drops). Using step structures in this situation is also consistent with the following recommendation from the Fisichenich paper:

"In the event that computed hydraulic values exceed thresholds for any desirable lining or stabilization technique, measures must be undertaken to reduce energy within the flow. Such measures might include the installation of low-head drop structures or other energy-dissipating devices along the channel."

With regard to the KY 15 project, it has been about three months since we have been on site. At that time, we observed issues with only about 2 percent of the step pools that were built. These step pools were built on a fill site, and the issues we observed appeared to be more related to the nature of the fill placement rather than flow stresses. On the Locust Creek project, we limited the use of long, continuous reaches of step pools, as was the case with KY 15, which should further increase reliability. In addition, the fill site slopes on KY 15 are steeper than those in the upper reaches of Locust Creek (a maximum of 22% with the remainder 15% or less on KY 15 compared to a maximum of 15% with the remainder less than 11% on Locust Creek).

11/3/2009

I hope this explanation is helpful. Please let me know if you have any questions.

Joe Eigel, PE, PhD
Senior Project Engineer
Stantec
350 Missouri Avenue Suite 100
Jeffersonville IN 47130-3001
Ph: (812) 285-4071
Fx: (812) 285-4061
Cell: (502) 759-0052
Joe.Eigel@stantec.com

stantec.com

The content of this email is the confidential property of Stantec and should not be copied, modified, retransmitted, or used for any purpose except with Stantec's written authorization. If you are not the intended recipient, please delete all copies and notify us immediately.



Please consider the environment before printing this email.